

Enhanced Geomorphic Design for Rural Waste-Scapes



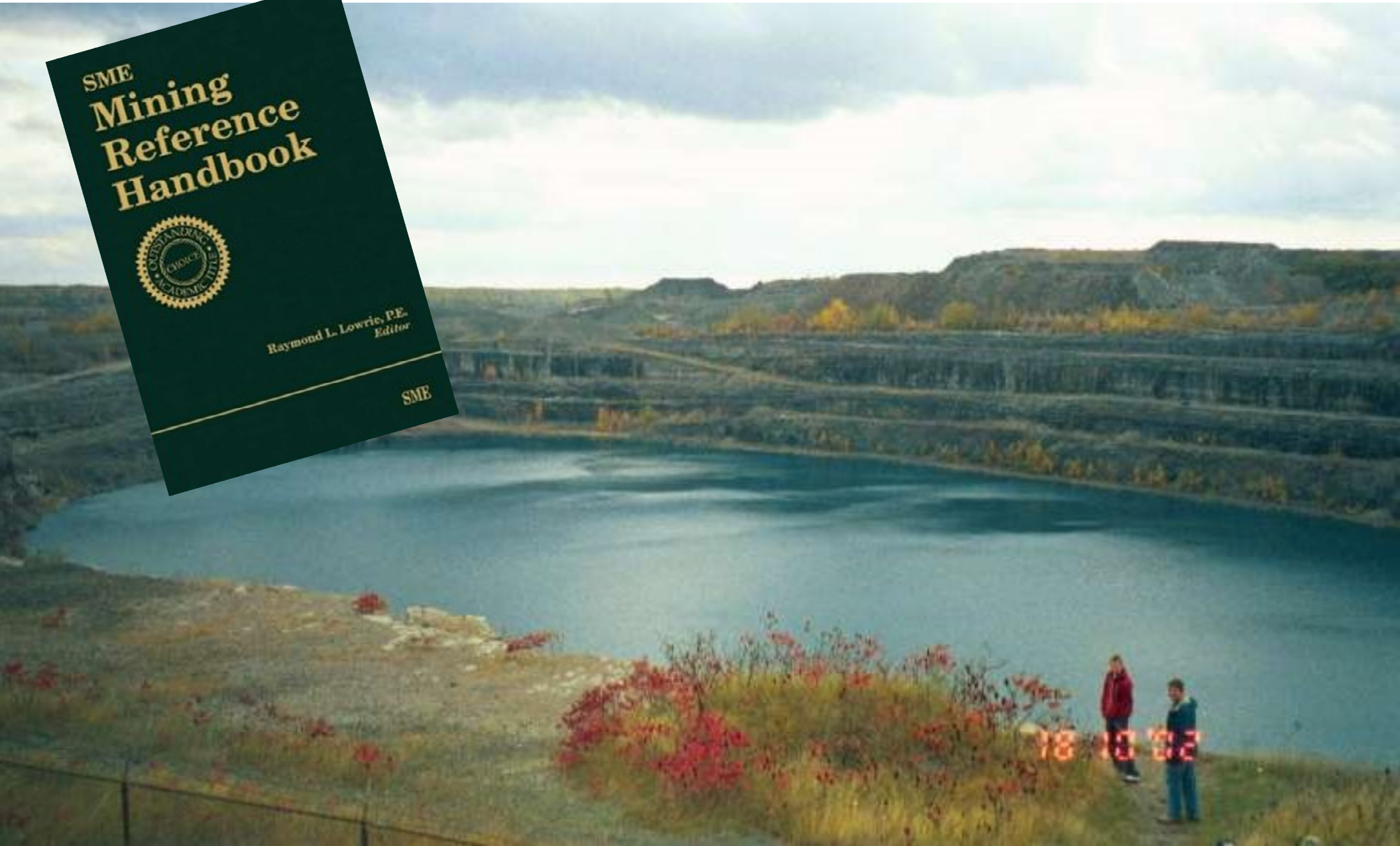
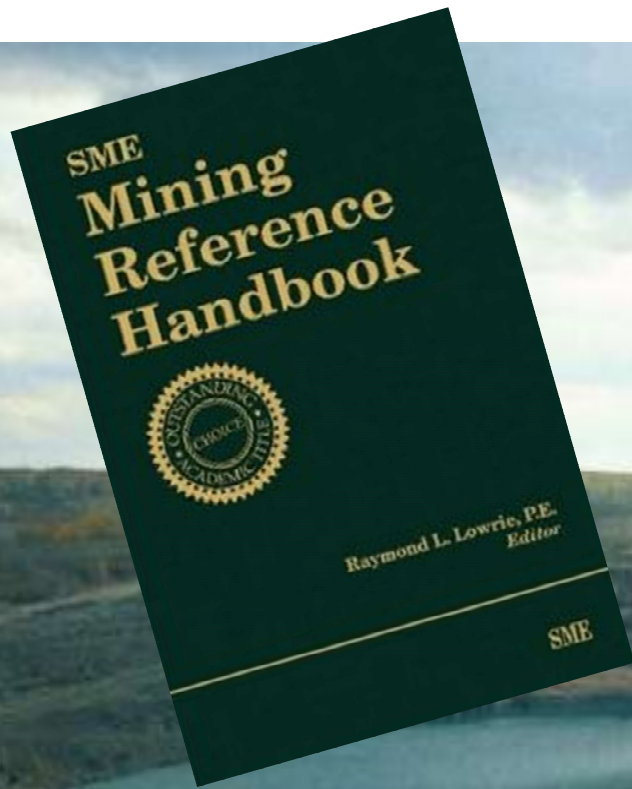
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URBAN VS. RURAL



RURAL RECLAMATION?



MINING IS WASTE MANAGEMENT

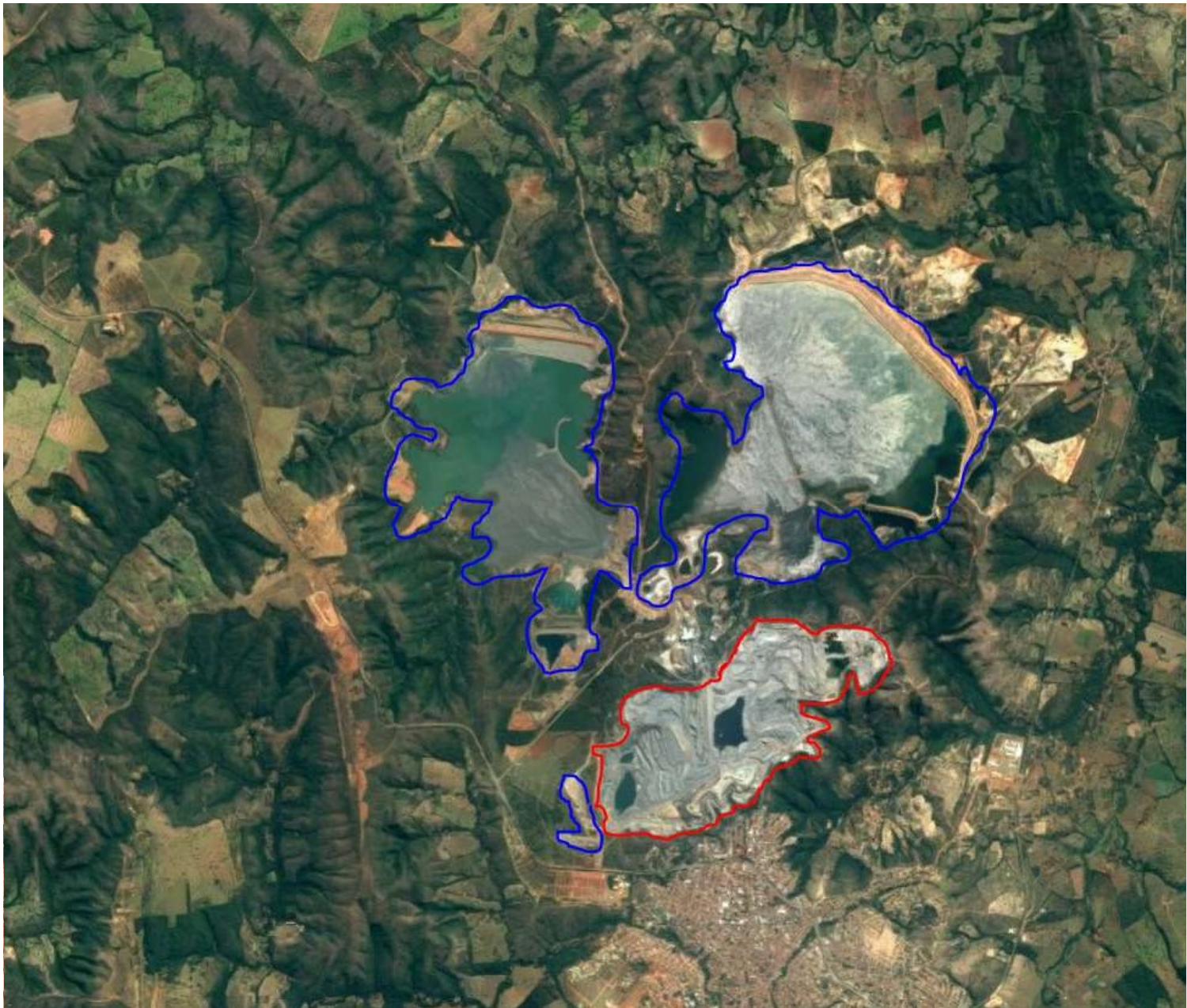


Image: Chuquicamata, Chile (Top left), Others: Morro do Ouro, Brazil

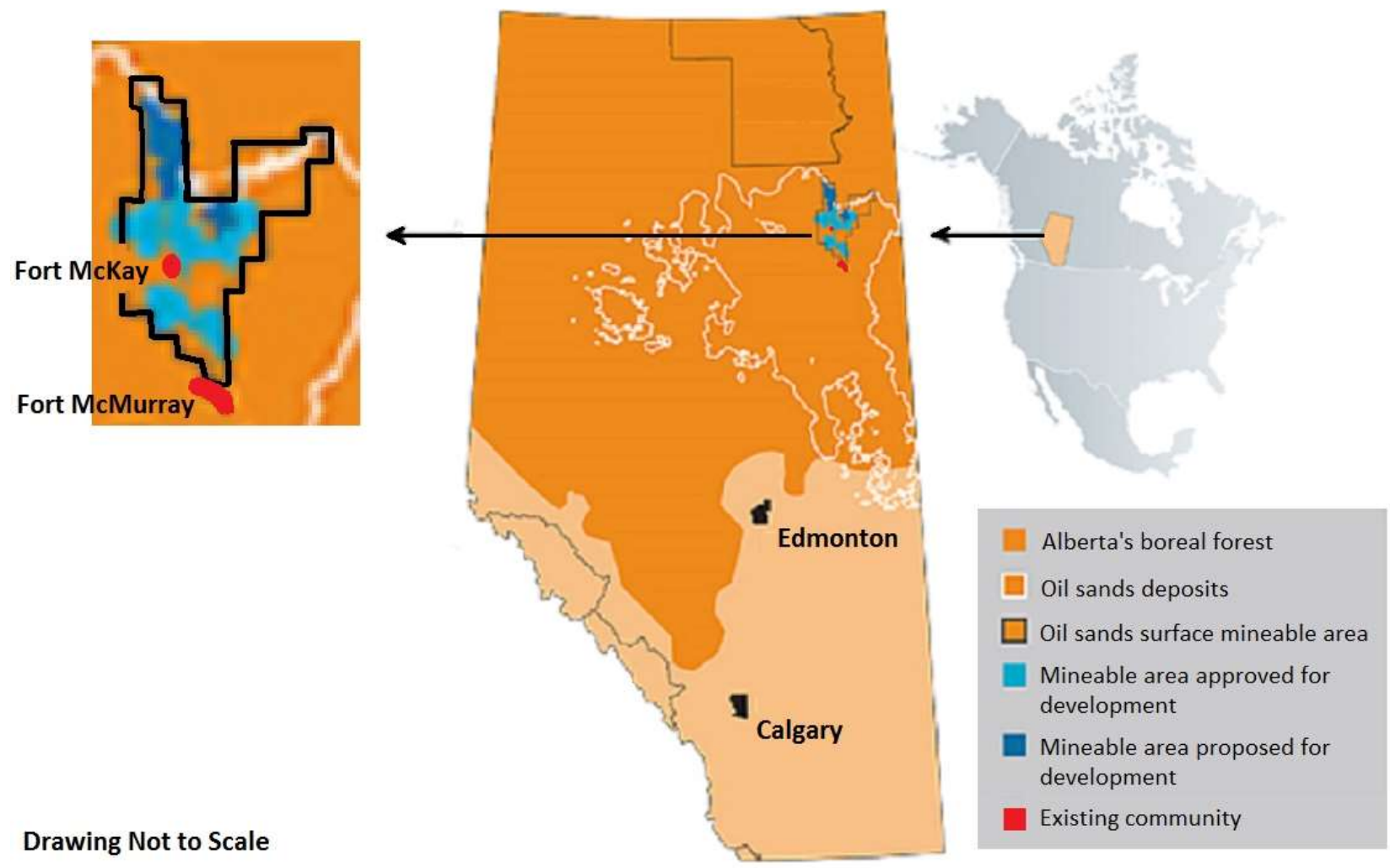
THE ALBERTA OIL SANDS (AOS)



Images: <http://ifs-mlws.sites.olt.ubc.ca/files/2016/03/External-tailings-facility-e1457473930460-940x430.png> & www.businessinsider.com

LANDSCAPE VS. LANDFORM

“a distinct association of landforms, as operated on by geologic processes (exo- or endogenic), that can be seen in a single view”



Drawing Not to Scale

Image: Adapted from AER (<https://www.aer.ca/about-aer/spotlight-on/oil-sands>).

NATURALLY OCCURRING TERRAIN & SOILS

- Relatively flat terrain, glacial landforms from 10,000 years ago
- Glaciofluvial (silt & sands), glaciolacustrine soils (clays), glacial till (unsorted mixture of grain sizes from coarse gravel to fine clay)
- Dense boreal forest, thick peat layers & muskeg wetlands cover 50%

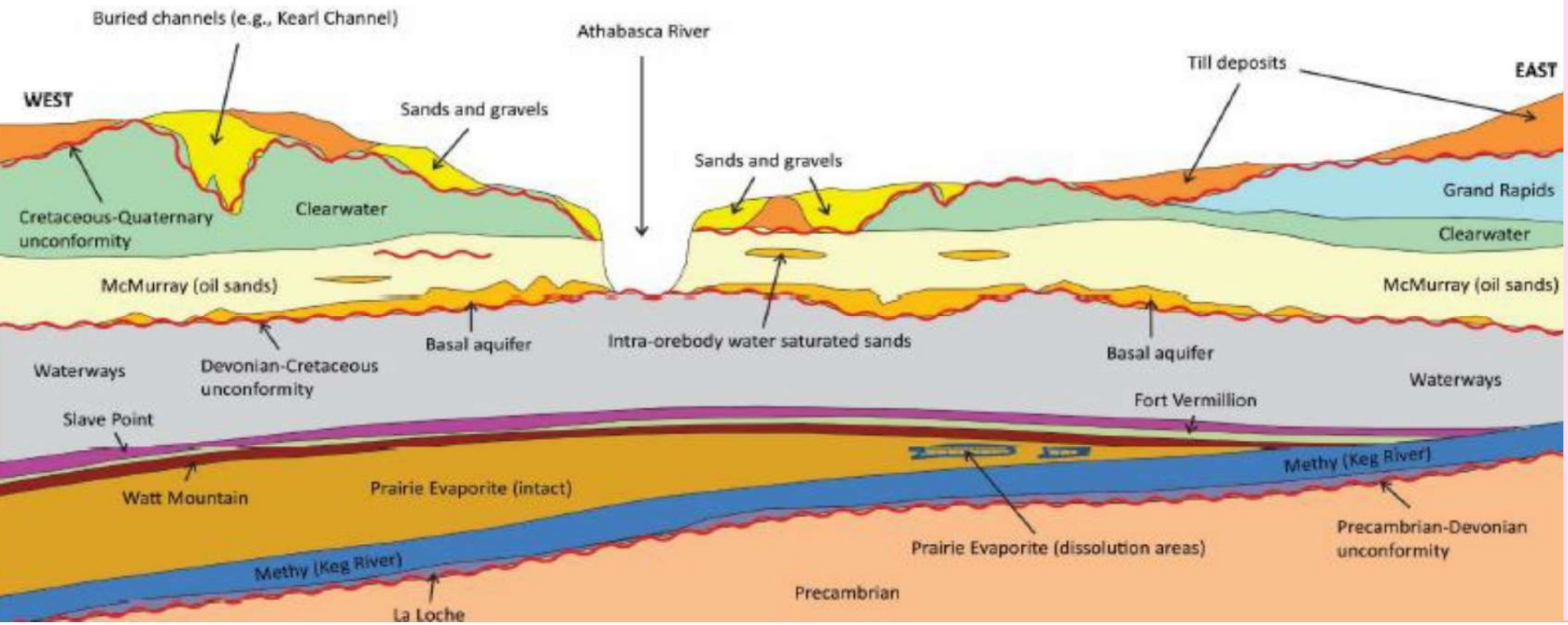


Image: Shell Canada Energy, 2016.

NATURALLY OCCURRING TERRAIN & SOILS



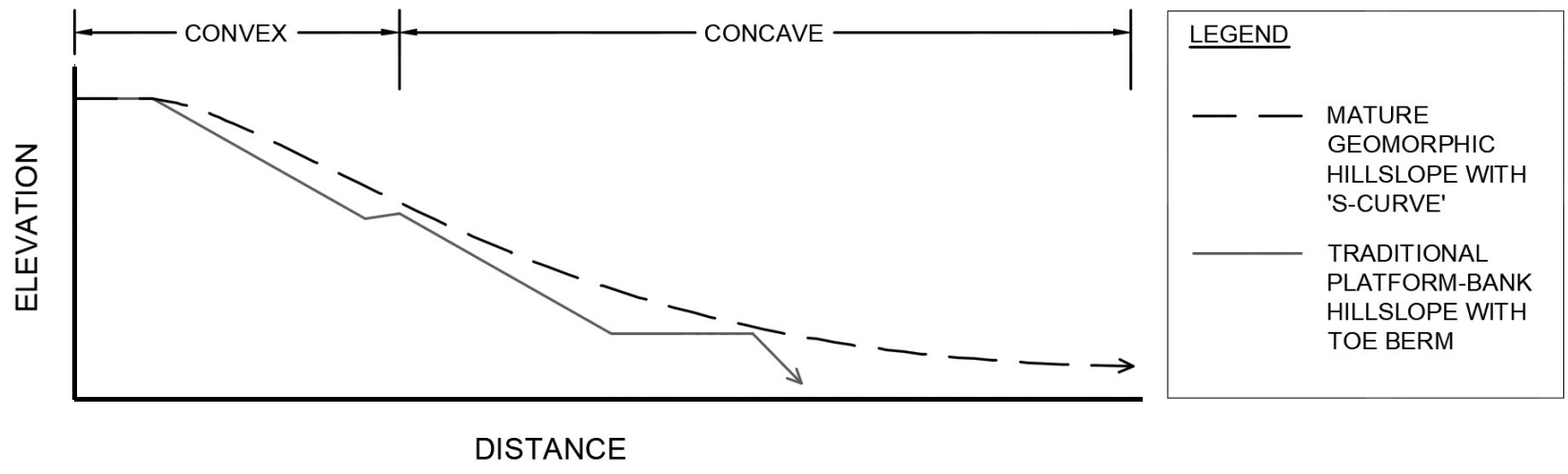
Image: www.ftmcmurraytourism.com

PROPOSED POST-MINING LANDFORMS & SOILS



Image: Suncor Pond One, Courtesy of www.Suncor.com

FORM AS A BASIS FOR LONG TERM SUCCESS



FLUVIAL EROSION @ TAILINGS DAM

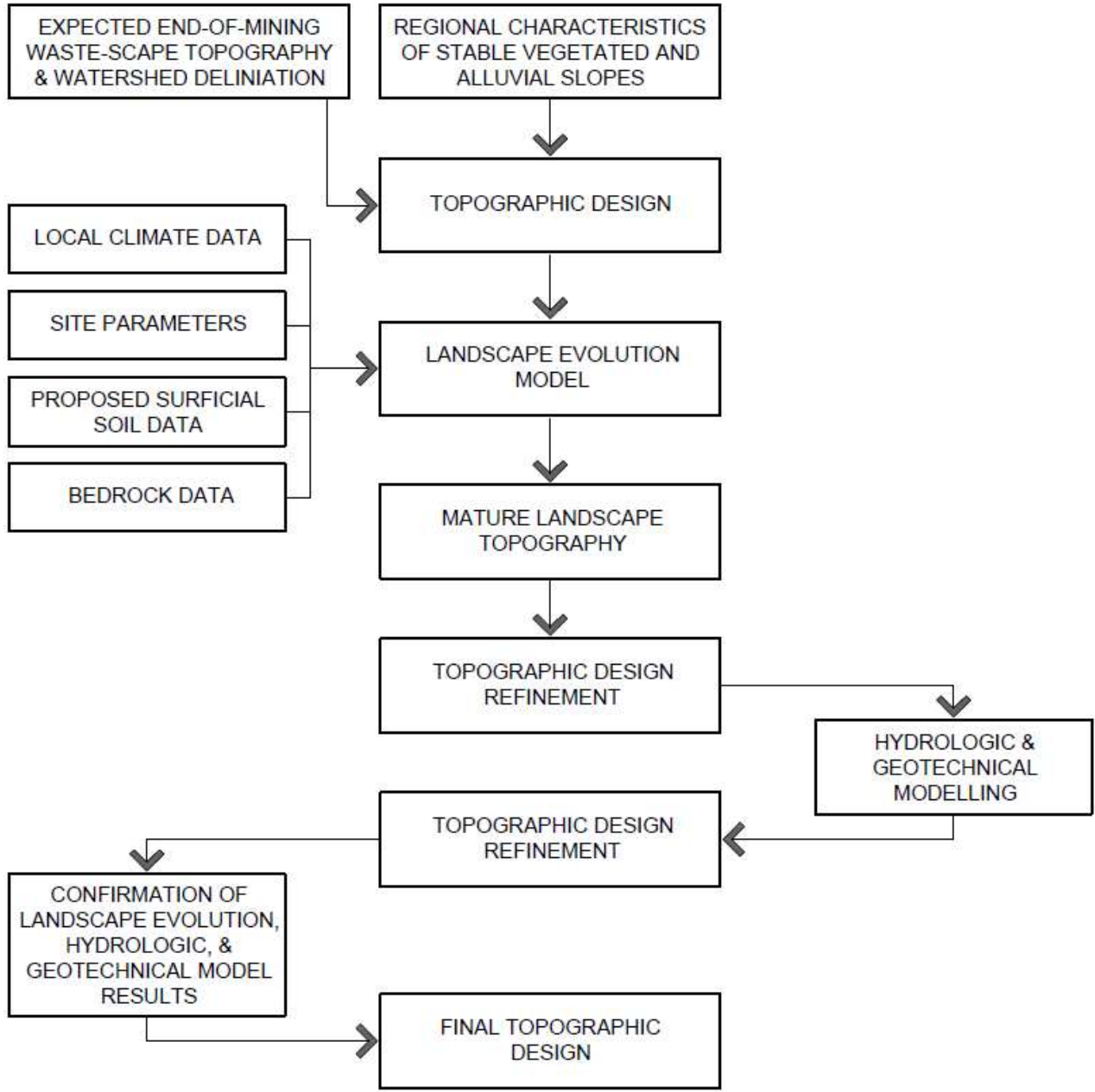
From top of dam:



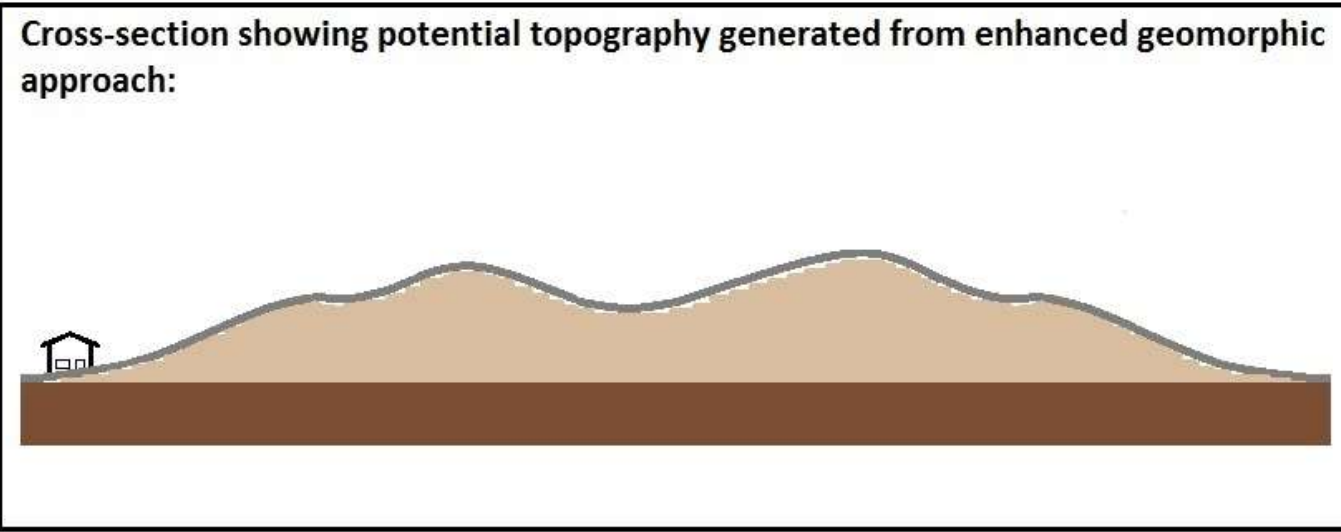
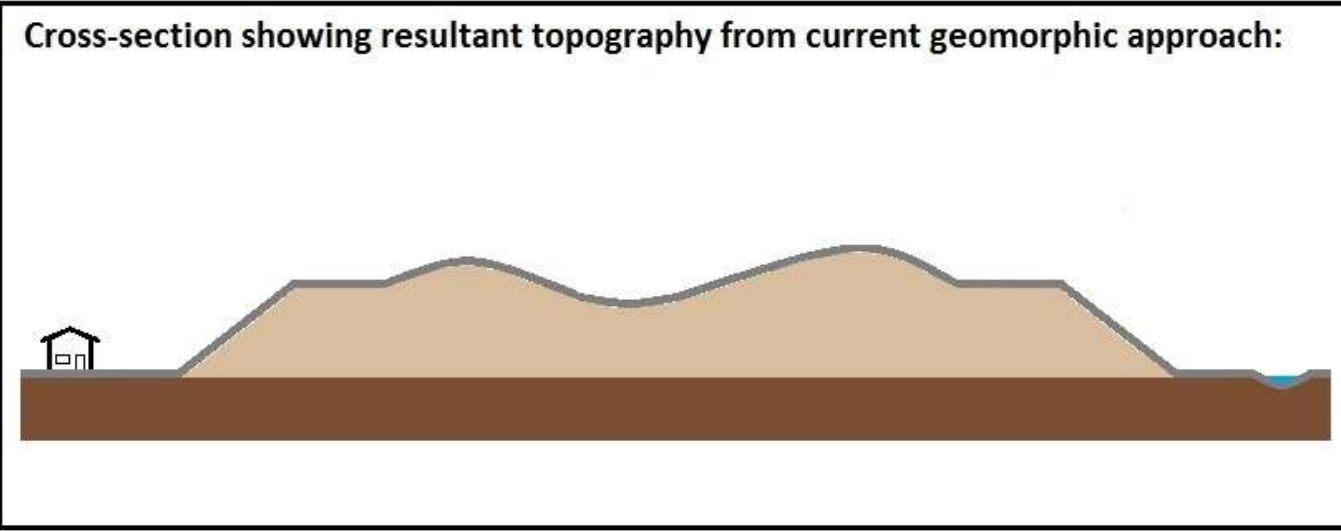
From bottom of dam:



FRAMEWORK WITH LEM'S



ENHANCED GEOMORPHIC DESIGN



PRELIMINARY RESULTS

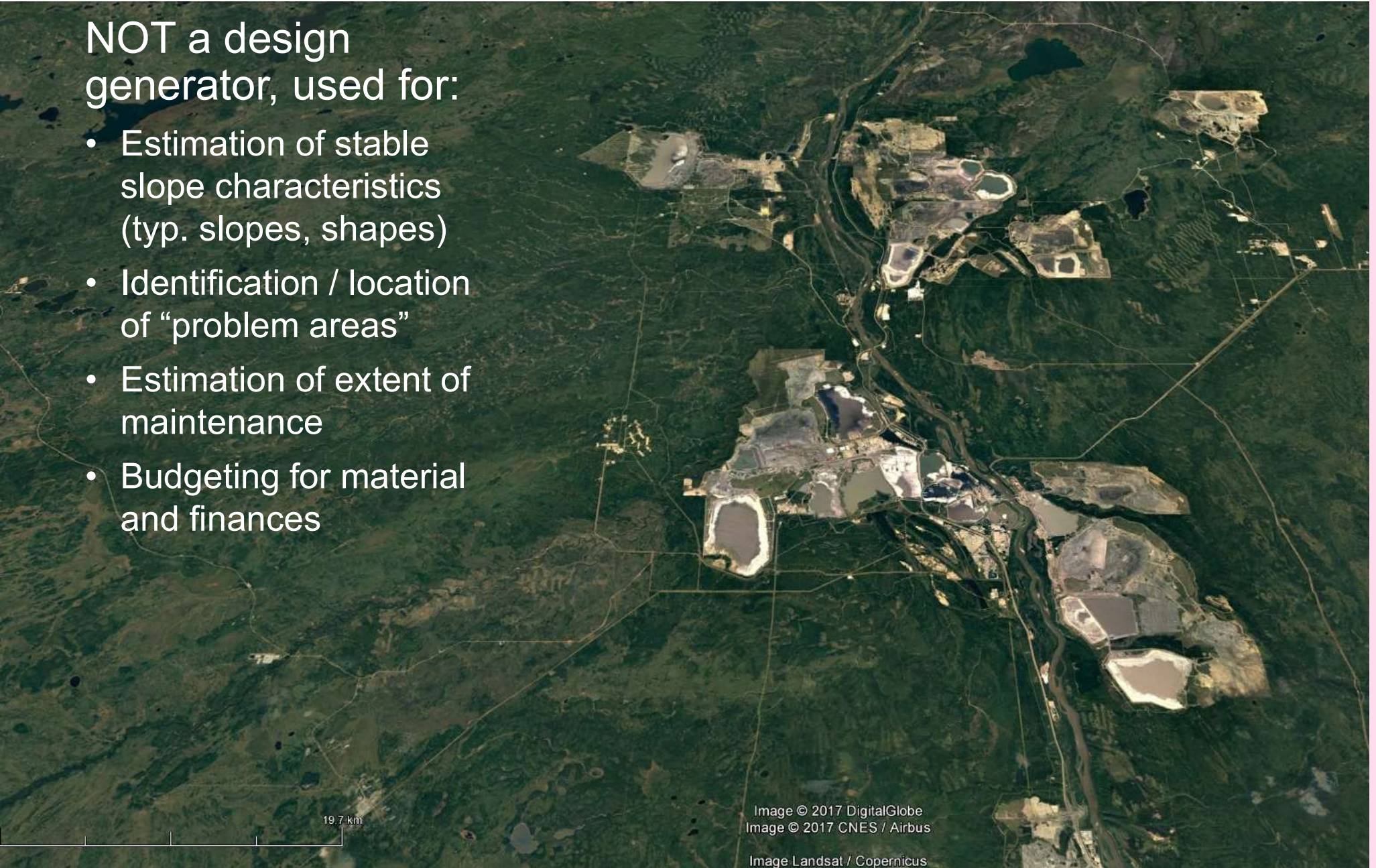
Tailings pond subjected to one 1-in-100 precipitation event using CAESAR-Lisflood LEM:



CONCLUSIONS

NOT a design generator, used for:

- Estimation of stable slope characteristics (typ. slopes, shapes)
- Identification / location of “problem areas”
- Estimation of extent of maintenance
- Budgeting for material and finances



QUESTIONS OR COMMENTS?

